BLUE WATER FOOTPRINT BASED ON INDUSTRIAL ACTIVITIES IN KUANTAN RIVER BASIN

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Di seluruh pelosok dunia, jutaan manusia adalah di dalam bahaya akibat kekurangan bekalan makanan dan air, melemahkan asas kestabilan tempatan, nasional dan global. Persaingan bagi sumber-sumber terhad – terutamanya air- semakin meningkat, menyulitkan dilema keselamatan terdahulu dan menghasilkan dilema yang baharu. Oleh itu, kajian ini bertujuan untuk menentukan “blue water footprint” bagi aktiviti perindustrian di Lembangan Sungai Kuantan serta untuk mengenalpasti kesan pembangunan penggunaan tanah kepada “blue water footprint accounting” dari tahun 2015 sehingga 2017. Seterusnya adalah untuk meramal kelangsungan Loji Rawatan Bekalan Air di Lembagan Sungai Kuantan. Oleh itu, bagi mencapai objektif yang telah dinyatakan, jumlah bagi “water footprint” dari setiap loji rawatan air akan dikira dan pengagihan pembangunan penggunaan tanah akan dikaji. Satu siri pemodelan akan dibuat dengan menggunakan ANN – sejenis tol aplikasi “Artificial Intelligence” (AI) di Matlab. Oleh itu, hasil dari jumlah “water footprint”, kesan pembangunan penggunaan tanah dan nilai ramalan bagi “water footprint” pada masa akan datang akan ditentukan.

ABSTRACT

Around the globe, millions of people are greatly in danger of not having enough food and water supply, weakening the very basic foundation of local, national and global stability. Competition for scarce resources – especially water- is increasing, aggravate the old security dilemmas and creating new ones. Thus, this study aimed to determine the blue water footprint for industrial activities in Kuantan River Basin and to identify the effect of land use development to the accounting of blue water footprint from 2015 until 2017. Next, to forecast the sustainability of Water Supply Treatment Process in Kuantan River Basin. Therefore, in order to achieve the stated objectives, total water footprint from each water treatment plant will be counted and the distribution of land use development will be analysed. A series of modelling using ANN – an Artificial Intelligence (AI) application tolls in Matlab. Hence, the results of amount blue water footprint, effect of land use development and the future value of predicted water footprint shall be determined.

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LIST OF ABBREVIATIONS

AI	Water Foo
WTP	Water Treatment Plant
WSTP	Water Supply Treatment Plant
A	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DOE	Department of Environment
EC	Electrical Conductivity
FE	Iron
HACH DR 5000	Spectrophotometer Procedures Manual
H_2SO_4	Sulphuric Acid
K	Potassium
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
Mg	Magnesium
Mg/L	Milligram per litre
Na	Sodium
NH3-N	Ammoniacal Nitrogen
NO^{-3}	Nitrate
NTU	Nephelometric Turbidity Units
NWQS	National Water Quality Standard
pH	Potential Hydrogen
$PO\ ^{3}-_{4}$	Phosphate
SI	Sub-indices
TSS	Total Suspended Solid
μs/cm	Microsiemens per centimetre
WQI	Water Quality Index

CHAPTER 1

INTRODUCTION

1.1 Background of Study

In a world where populated by almost eight billion of people, the discussion on the access to the clean water has been the major topic discussed globally. The major problem that is faced by the developing countries is the availability of clean water to be supplied to the rural areas. Competition for scarce resources – especially water – is increasing, exacerbating old security dilemmas and creating new ones (Ban Ki-moon, 2011). According to World Health Organization (WHO), over 1 billion people outside the United States of America do not have access to clean and safe drinking water where 3.4 million people die each year from scarce and contaminated water sources. It can be said that, half of the world's hospital beds are occupied by patients that suffer from Deceases related to lack of access to clean water.

Back in Malaysia, the issue that arises regarding the water is high rates of water wastage. Domestic, industrial and agricultural use has become the top sectors in producing the water wastage. High rates of Non-revenue Water (NRW) is listed as the contributor to the problem that were faced by this country wholly. The rates of NRW in Malaysia has a national average of 40% which equals to a loss of 40 liters out of every 100 liters of treated water. Other than that, changing in weather patterns has affected the water resources. For example, in 1997 and 1998, the El Nino brought severe drought resulting in water crises in many regions of Malaysia. The prediction of water availability in future shall be carried efficiently to ensure the sustainability of water resources.

1.2 Problem Statement

The development of industrial activities in Kuantan Industrial Area has increased gradually from 2015 to 2016. The significant increment in percentage of land use will definitely affect the usage of fresh water since there will also be an increment in the population of Kuantan residents. Therefore, an assessment on the water availability is very important in determining the future water resources. To overcome problems such as unnecessary water shortage that usually strike Kuantan's residents, the accounting of Blue Water Footprint (BWF) in future using Artificial Neural Network (ANN) will give an exact figure of how long the water could be supply in a period of time.

1.3 Research Objectives

The objectives are as the followings:

i. To determine Blue Water Footprint for industrial activities in Kuantan River Basin
ii. To study the effect of land use development to the Blue Water Footprint accounting
iii. To predict the sustainability of WSTP at Kuantan River Basin.

1.4 Scope of Study

This study focusses on the sustainability of Kuantan River Basin in coming years to become the main source of water in Kuantan district. The evaluation of BWF in all five Water Treatment Plant (WTP); Semambu WTP, Panching WTP, Sungai Lembing WTP, Bukit Ubi WTP and Bukit Sagu WTP will provide an amount of treated water to be distributed to their respective area of supply. The source of water intake for all five WTP is Sungai Kuantan. The secondary data for parameters involved such as rainfall intensity in the accounting of BWF is obtained from the local authority, Pengurusan Air Pahang Berhad (PAIP) and others.

1.5 Significance of Study

From this study, the determination of Blue Water Footprint for industrial activities in Kuantan River Basin can be determined from the accounting of water footprint at five Water Treatment Plant. The increasing in overall percentage of industrial zone analysis for Kuantan district will be study whether it effects the accounting of BWF in future. For prediction of sustainability of WSTP in future coming can be made by using a series of modelling by using normalised water footprint data. Hence, the beneficial results of well management of land use is expected to be produced for future wellness.

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